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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

THOMAS, COURTNEY D

ART UNIT PAPER NUMBER

2882

DATE MAILED: 03/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/064,775

Applicant(s)

HOFFMAN, DAVID MICHAEL

Examiner

Courtney Thomas

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11/4/02</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to because the enclosed Figures do not illustrate an imaging system wherein the first radiation detector is disposed to be non-adjacent to the second radiation detector (see claims 4 and 33). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 5, 22 and 36-45 are objected to because of the following informalities:
3. Claim 5 recites: "said radiation source". Examiner notes there is no antecedent basis for the use of this term.
4. Claim 22 recites dependency that appears to be directed to claims 20 and 23. Examiner notes that dependency on claim 23 is improper (see MPEP 608.01 (m)) and multiple dependency requires that the claim be written in the alternative (see MPEP 608.01 (n)).
5. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- 3/18/04
7. Claim 7 ^{and 36-45 are} ~~is~~ rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. In particular, the preamble of claim 7 recites: "A method for differentiating material characteristics ... comprising ..." However, Examiner notes that there are no recited steps for differentiating material characteristics as suggested by the preamble. Accordingly, the claim as written is incomplete.

8. Claim 36 recites: "A computer data signal comprising: code configured to cause a processor to implement a method ... the method further comprising: ..." Examiner notes that it is unclear what the claim is directed to. By virtue of their dependency claims 37-45 are treated similarly. Examiner suggests claim 36 be rewritten as follows: "~~A computer data signal comprising: code configured to cause a processor to implement a method ... the method further comprising: ...~~"

Claim Rejections - 35 USC § 101

9. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 36-45 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In particular, claims 36-45 appear to be directed to a computer data signal. As best understood by the Examiner, the claimed signal appears to refer to an

Art Unit: 2882

impulse or a fluctuating electric quantity, such as voltage, current or electric field strength, to trigger or implement a process. The claims as written are not patentable, since the subject matter represents a form of natural phenomena (see MPEP 2105).

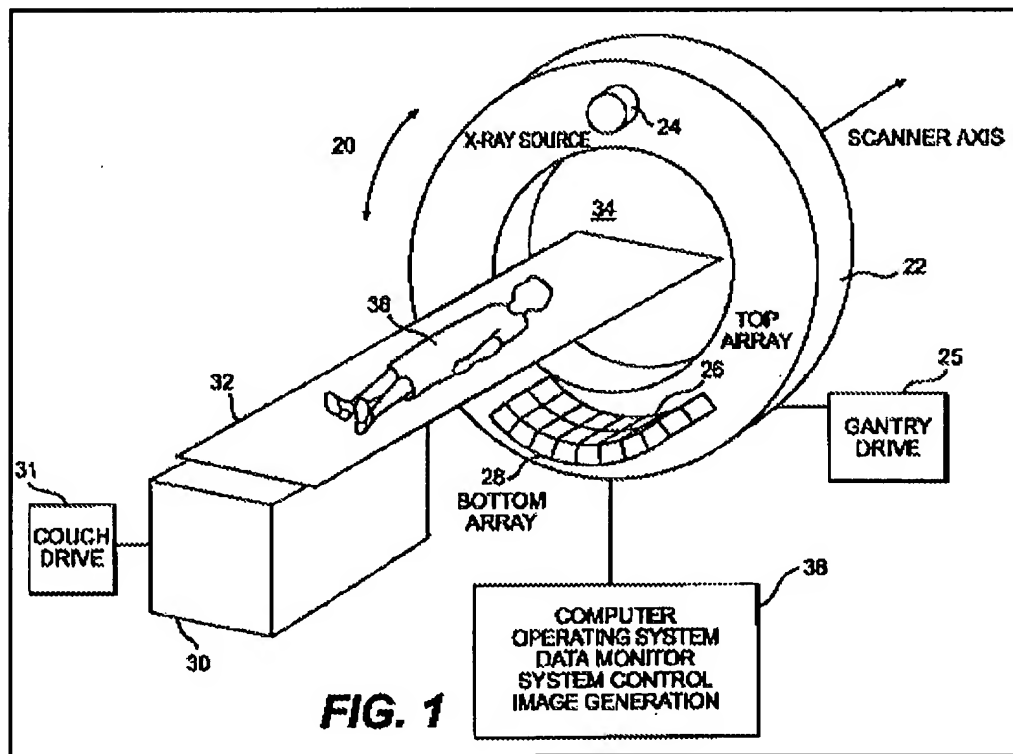
Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

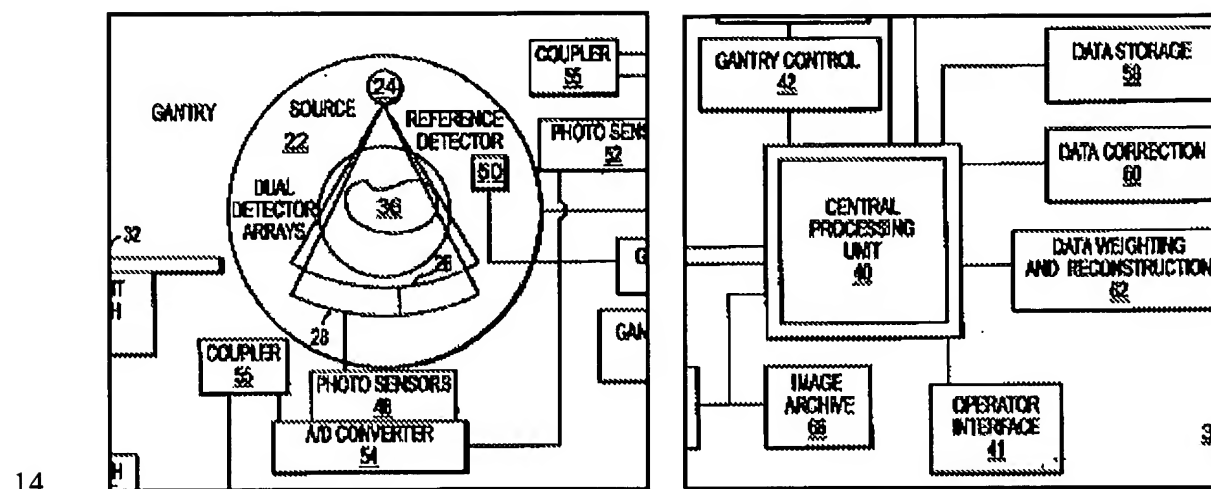
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1, 3, 4-8, 10-13, 15-17, 20-23, 25-27, 30, 36-39 and 41-43 are rejected under 35 U.S.C. 102(b) as being anticipated by *Sivers* (U.S. Patent 6,072,851).



13.

Art Unit: 2882



Figures 1 and 2 (sectioned) – U.S. Patent 6,072,851 to Sivers

15. As per claims 1 and 30, Sivers discloses a computed tomography (CT) imaging system (20) comprising a gantry (22) wherein the gantry defines a patient cavity (34) and includes an X-ray source (24) and a radiation detection apparatus, wherein the radiation detection apparatus includes a first radiation detector (26) and a second radiation detector (28) and wherein the X-ray source (24) and radiation detection apparatus (26, 28) are rotatably associated with the gantry (22) so as to be separated by the patient cavity (34); a patient support structure (32) and a processing device (40).

16. As per claim 3, Sivers discloses a computed tomography (CT) imaging system wherein the first radiation detector (26) is disposed so as to be adjacent to the second radiation detector (28) (see Fig. 1, above).

17. As per claim 4, Sivers discloses a computed tomography (CT) imaging system wherein the first radiation detector (26) is disposed so as to be non-adjacent to the second radiation detector (28) (Examiner notes that detectors 26 and 28 are off-set from each other - see Fig. 2, above).

Art Unit: 2882

18. As per claim 6, Siverson discloses a computed tomography (CT) imaging system wherein the X-ray source (24) includes a first X-ray emitter opposingly disposed relative the first and second radiation detectors (see Fig. 1 above).

[57]

ABSTRACT

A computerized tomography system is provided with a gantry that is rotatable in an X-Y plane transverse to a Z reference axis. The gantry has an opening through which a support on a couch is linearly movable along the Z-axis. An X-ray source directs rays across the gantry opening to a pair of arrays of X-ray detectors. Doing a rapid scan the gantry is rotated as the support is moved linearly so that a helical path is followed by the X-ray source. The resultant dual array data is combined and processed to generate successive quality X-Y planar images.

19.

Abstract - U.S. Patent 6,072,851 to Siverson

20. As per claims 7, 20 and 36, Siverson discloses a method comprising the steps of a) obtaining a computed tomography (CT) imaging system that includes a radiation source and a radiation detection apparatus having a first radiation detector and a second radiation detector, b) operating the imaging system so as to cause the radiation source to emit a radiation beam toward the radiation detector apparatus such that the first radiation detector generates first detector data and the second radiation detector generates second radiation data and c) processing the first detector data and second detector data to generate an image (see Abstract, shown above). Examiner further notes that it is commonly accepted within the radiation art to incorporate method steps into media (such as computer readable media) to actuate system components for automated processes via a computer data signal. Additionally, although the reference does not explicitly disclose the presence of computer data signals configured to actuate the system, it is understood that these signals exist in computer assisted X-ray imaging systems similar to the

Art Unit: 2882

above noted reference. Computer data signals are needed to electronically communicate with system components, and provide information and/or instructions to actuate elements within the integrated system. Examiner concludes that computer data signals are inherent features of X-ray imaging systems and are integral in communicating and actuating components to perform automated tasks.

21. **As per claims 8, 10-13, 15-17, 21-23, 25-27, 37-39 and 41-43** Siverson discloses a method further comprising the steps of **a)** obtaining an imaging system (20) defining a patient cavity (34) and having a first x-ray emitter opposingly disposed relative to the first radiation detector (26) and the second radiation detector (28) such that the first x-ray emitter is separated from said first radiation detector and the second radiation detector via the patient cavity;

22. **b)** obtaining an imaging system having a patient support structure (32); wherein said imaging system defines a patient cavity; and wherein the patient support structure is movingly associated with said imaging system so as to allow the patient support structure to be disposed within said patient cavity;

23. **c)** associating a patient (36) with said patient support structure and disposing said patient support structure within the patient cavity;

24. **d)** operating the imaging system so as to cause the radiation source and said radiation detector apparatus to rotate around said patient cavity;

25. **e)** operating the imaging system so as to cause the radiation beam to pass through a patient;

26. **f)** wherein processing includes super positioning the first detector data and the second detector data so as to create image data and

Art Unit: 2882

27. g) processing the first detector data and the second detector data so as to differentiate between material characteristics, wherein the material characteristics include material type and material density (see Abstract; Figs. 1&2 (above) and respective portions of the specification).

Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

29. Claims 5, 9, 14, 15, 24 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sivers (U.S. Patent 6,072,851) as applied to claim 1 above, and further in view of Hsieh et al. (U.S. Patent 6,421,412).

30. **As per claims 5 and 34**, Sivers does not explicitly disclose a computed tomography (CT) imaging system wherein the X-ray source includes a first X-ray emitter opposingly disposed relative to the first radiation detector and wherein the X-ray source includes a second X-ray emitter opposingly disposed relative to a second radiation detector.

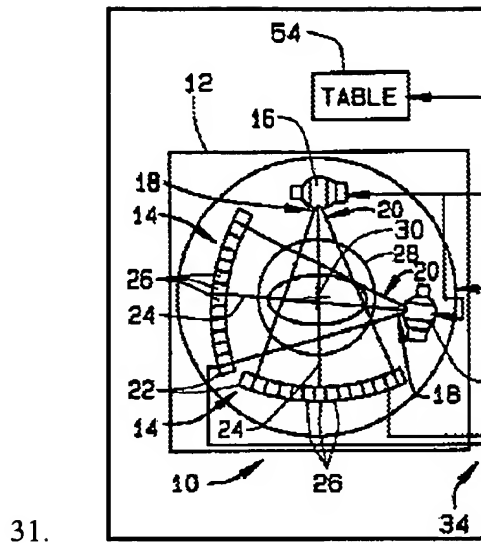


Figure 1 – U.S. Patent 6,421,412 to Hsieh et al.

32. Hsieh et al. disclose an imaging system wherein the X-ray source includes a first X-ray emitter opposingly disposed relative to the first radiation detector and wherein the X-ray source includes a second X-ray emitter opposingly disposed relative to a second radiation detector. Hsieh et al. teach the use of two source-detector pairs in an imaging system as a means for generating images of an internal organ, such as a heart without significant motion artifacts. Hsieh et al. further suggest that the use of the two-source-detector pairs reduces patient exposure by collecting projection data at a sufficiently high rate (see column 2, lines 35-37, 51-55; column 3, lines 3-6).

33. It would have been obvious to modify the imaging system of Sivers such that it incorporated a first X-ray emitter opposingly disposed relative to the first radiation detector and a second X-ray emitter opposingly disposed relative to a second radiation detector. One would have been motivated to make such a modification so that the imaging system is optimized to a) acquire projection data of the internal organs of a patient without significant motion artifacts and b) to reduce radiation exposure to a patient due to the systems' multiple data

Art Unit: 2882

generating/collecting means as suggested by Hsieh et al. (see column 2, lines 35-37, 51-55; column 3, lines 3-6).

34. **As per claims 9, 14, 15, 24** Sivers as modified above, discloses a method comprising the steps of: a) obtaining an imaging system having a first x-ray emitter, a second x-ray emitter and defining a patient cavity; wherein the first x-ray emitter is opposingly disposed relative to the first radiation detector so as to be separated by the patient cavity; and wherein the second x-ray emitter is opposingly disposed relative to the second radiation detector so as to be separate by the patient cavity;

35. **b)** operating the imaging system so as to cause the first x-ray emitter to project a first x-ray beam toward the first radiation detector and so as to cause the second x-ray emitter to project a second x-ray beam toward the second radiation detector; wherein the first x-ray beam passes through a patient so as to generate a first attenuated x-ray beam, wherein the first attenuated x-ray beam is communicated with the first radiation detector; and wherein said second x-ray beam passes through said patient so as to generate a second attenuated x-ray beam, wherein the second attenuated x-ray beam is communicated with the second radiation detector and

36. **c)** operating said imaging system so as to cause the first x-ray emitter to project a first x-ray beam toward said first radiation detector; wherein the first x-ray beam passes through a patient so as to generate a first attenuated x-ray beam, wherein the first attenuated x-ray beam is communicated with the first radiation detector and the second radiation detector (see Abstract; Figs. 1&2 (above) and respective portions of the specification). Examiner further notes that it is commonly accepted within the radiation art to incorporate method steps into media (such as computer readable media), to actuate system components for automated processes. Additionally,

Art Unit: 2882

although the references do not explicitly disclose the presence of computer data signals configured to actuate the systems, it is understood that these signals exist in computer assisted X-ray imaging systems, such as those disclosed in Sivers (U.S. Patent 6,072,851) and Hsieh et al. (U.S. Patent 6,421,412). Computer data signals are needed to electronically communicate with system components, and provide information and/or instructions to actuate elements within the integrated system. Examiner concludes that computer data signals are inherent features of X-ray imaging systems and are integral in communicating and actuating components to perform automated tasks.

37. Claims 18, 19, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sivers (U.S. Patent 6,072,851) as applied to claims 1, 20 and 36 above and further in view of Yan et al. (U.S. Patent 6,324,240).

38. **As per claims 18, 19, 28, 29, 44 and 45**, Sivers does not explicitly disclose a method wherein processing involves the implementation of a beam hardening correction scheme.

39. Yan et al. teach that quantitative measurements and CT images are affected by beam hardening error in X-ray attenuation measurements. The presence of these errors violates the principle that greater attenuation of radiation is related to greater internal path lengths (i.e. thickness of internal structure – see column 1, lines 39-63). Yan et al. teach that beam correction schemes enable accurate quantitative measurements from obtained CT images.

40. It would have been obvious to further modify the method of Sivers such that it incorporated processing involving beam hardening correction. One would have been motivated to make such a modification in order to generate quantitative measurements that correctly relate

Art Unit: 2882

the internal thicknesses of a structure based on the received attenuation data as taught by Yan et al. (column 1, lines 39-63).

Allowable Subject Matter

41. Claims 2 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

42. As per claims 2 and 31, the Examiner found no reference in the prior art that disclosed or made obvious a computed tomography (CT) imaging system wherein the first radiation detector is a scintillator/photo-sensor detector and wherein the second radiation detector is a direct conversion detector.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Courtney Thomas whose telephone number is (571) 272-2496. The examiner can normally be reached on M - F (9 am - 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272 2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2882

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CT
Courtney Thomas



EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER